Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: B.Tech**
Sub_Code: REL6D001

7th Semester Regular/Back Examination: 2025-26
SUBJECT: Electric Power System Protection
BRANCH(S): EEE
Time: 3 Hours
Max Marks: 100
Q.Code: U382

Answer Q1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) List the basic requirements of protective relay.
b) What is back-up protection?
c) Define the term – burden and over reach as related to protective relay.
d) What are the advantages of numerical relay over electromagnetic relay?
e) Define active recovery voltage and re-striking voltage of a circuit breaker.
f) What is current chopping with respect to circuit breaking.
g) Write two limitations of SF_6 circuit breakers.
h) Give the limitations of Merz-Price Protection.
i) Name the types of faults that can be protected by the Bucholz Relay.
j) How are the CTs on the primary and secondary side of a Y-Δ transformer connected for differential protection and why?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Describe the zones of protection. Explain the zones of protection for different distance relay.
b) A 25 MVA, 13.2 kV alternators with solidly grounded neutral has a sub transient reactance of 0.25 p.u. The negative and zero sequence reactance are 0.35 and 0.1 p.u. respectively. A line-to-line fault occurs at the terminals of an unloaded alternator; determine the fault current and the line to ground voltages. Neglect resistance.
c) What type of a protective scheme is employed for the protection of the field winding of the alternator against ground faults?
d) What is 'Restricted earth fault protection' of transformer? Justify the use of the term 'Restricted'
e) Explain briefly regarding numerical over current protection by suitable block diagram.
f) Describe construction, operating principle and application of vacuum circuit breaker. For what voltage range is it recommended?

g) A three-phase transformer rated 33/11 KV ,500 KVA star-delta, has a CT rating of 20/1 on H.V side in each phase. What will be the rating of the C.T on the L.V side so that it won't respond to any fault.

h) Explain clearly how transmission lines are protected by definite distance and time distance relay.

i) With neat sketch and phasor diagram explain how a negative phase sequence relay is employed for protection of electrical power system.

j) Explain with essential sketches the working of different types of Oil circuit Breaker.

k) Describe the operating principle, constructional features, and area of applications of mho relay.

l) Explain with essential sketches the working of a cross blast and axial air blast CB. Enumerate the advantages of air blast CB for high voltage.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Describe the operating principle, constructional features, and area of applications of directional over current relay. **(16)**

Q4 Determine the time of operation of a relay of rating 5 amps, 2.2 sec IDMT and having relay setting of 125 % with TMS = 0.6. It is connected to a supply circuit through a CT of 400/5 ratio. The fault current is 4000 A. **(16)**

Q5 A generator is protected by restricted earth fault protection. The generator ratings are 13.2 kv, 10 MVA. The percentage of winding protected against phase to ground fault is 85 %. The relay setting is such that it trips for 20 % out of balance. Calculate the resistance to be added in the neutral to ground connection. **(16)**

Q6 Describe the construction, operating principle, and application of SF_6 circuit breaker, with neat sketch. Also discuss its advantages over other types of circuit breaker. **(16)**

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